

Yale University

EliScholar – A Digital Platform for Scholarly Publishing at Yale

Yale Medicine Thesis Digital Library

School of Medicine

1-1-1861

Dissertation on lead poisoning

Joel Wilbur Hyde
Yale University.

Follow this and additional works at: <https://elischolar.library.yale.edu/ymtdl>



Part of the [Medicine and Health Sciences Commons](#)

Recommended Citation

Hyde, Joel Wilbur, "Dissertation on lead poisoning" (1861). *Yale Medicine Thesis Digital Library*. 3830.
<https://elischolar.library.yale.edu/ymtdl/3830>

This Open Access Thesis is brought to you for free and open access by the School of Medicine at EliScholar – A Digital Platform for Scholarly Publishing at Yale. It has been accepted for inclusion in Yale Medicine Thesis Digital Library by an authorized administrator of EliScholar – A Digital Platform for Scholarly Publishing at Yale. For more information, please contact elischolar@yale.edu.



Digitized by the Internet Archive
in 2017 with funding from
Arcadia Fund

Harvey Cushing / John Hay Whitney
Medical Library

HISTORICAL LIBRARY



Yale University

B61



Archives

T113

Y11

1861

A Dissertation
on

Lead Poisoning,

by

Isaac Wilbur Hyde.

Greenwich, Conn.

This includes poisoning by any of the preparations of lead. The symptoms are various, and always well defined. The general system, or that part of it attacked, is so attacked by the action of lead on the nervous system: internally, there is mere increase of nervous action; externally, there may be increased sensation and motion, or one or both may be lost.

The preparations of lead most used in the Arts and in Medicine, are litharge, red lead, the carbonate or white lead, the acetate, or sugar of lead, and the sub-acetate or Goulard's Extract. The two last are soluble in water, and consequently most active in their effects on the animal Economy. The others in a greater or less degree, when acted upon by the acid secretions of the stomach, acquire the poisonous qualities attributed to them.

Lead in any of the above forms,

may, unwittingly, be introduced into the system. We do not wish to be understood, that lead poisoning generally occurs from the medicinal exhibition of any of the lead preparations; for this is seldom a sequence, but, still, proof is not wanting, that all the symptoms have in reality presented themselves upon the long continued use of a solution of the subacetate of lead upon abraded surfaces: furthermore, instances are stated of similar results following the use of large and repeated doses of the acetate internally.

Lead dealers, lead manufacturers, miners, painters, glaziers and others, equally intimate with preparations of lead, in their daily avocations, most frequently are the victims of this disease.

The vapor of melted lead, and the carbonate of the protoxide, more often produce it: - undoubtedly, because there

are more people exposed to lead in these forms than otherwise. Still, any preparation of lead, capable of finding its way into the circulation, may produce lead poisoning. It is fully understood, that by whatever avenue lead enters the system, its own peculiar effects are just as readily and distinctly observed.

The three principle ways of lead introduction are by the stomach, lungs and skin. Years ago lead was much oftener given as an internal medicine, and in much larger doses than now: hence, lead diseases were more frequent.

Tanquerel states many cases where doses varying from 6 to 10 grs. were given for several days, followed by the most marked and painful symptoms, and, in one or two cases, by death.

The accidental mixture of the carbonate of lead with flour, used for culinary purposes, has also produced like results,

as has the use of water, drawn from lead cisterns or through lead pipe.

There are, indeed, a hundred different ways for lead to be taken into the stomach, the victim being at the same time wholly unconscious of it, and any one of these may cause the deplorable results of which we speak.

In the early ages, medical men supposed that there was but one way by which lead could be introduced into the system, and that by the stomach. Although we now know of other means for its induction, still it has never been denied, that the stomach of all other organs, most often fulfills this act, and that by absorption.

The same may be said of the lungs, that the minute particles which come in contact with the membrane of the minute bronchi, are thence readily absorbed and taken into the system.

Individuals not working in lead are

seldom attacked with lead poisoning by breathing in particles of lead: — still this does occur.

Andral and Tanguerel both speak of lead poisoning from sleeping in newly painted rooms: — this, too, is known to come on very rapidly at times — one or two nights being sufficient to fully develop it.

A very remarkable case of poisoning by being in a newly painted room, occurred in this city, some time since: the patient as the case shows, was of the most acutely sensitive temperament, the patient remaining in the room only the short space of two or three hours, during which time all the symptoms of lead colic supervened.

Other cases of poisoning are noticed, in which the exciting cause was leaden particles inhaled with snuff, which had been confined in boxes lined with sheet lead. Speaking of this, Tanguerel says, "Certainly, the action of snuff on lead is very speedy; it begins after a few hours.

It forms acetate, carbonate and hydrochlorate of lead in from six to thirty grains pr. pound.

It may easily be conceived how persons who use snuff containing these salts, from the absorption of lead by the surface of the mucous pituitary membrane, will be attacked with symptoms of lead poisoning."

Absorption by skin. In regard to the actual absorption of lead by the skin, there was for a long time doubt. Experiments proved that ether, alcohol, opium and even mercury were readily absorbed by the skin, finding no invincible obstacles in the epidermis; but, it was yet to be proved that actual symptoms of lead poisoning had presented themselves through a like absorption of the lead. As before stated, these symptoms had occurred, where a solution of the sub acetate had been applied to denuded surfaces, but only known in those instances; never where the whole of these

integuments were entire. Prof. Pliny A. Jewett of the Yale Medical Institution had under his care a very interesting case, where all the symptoms of lead poisoning were brought on, by the use of a solution of Acetate of Lead; — R: $\text{Zi} - \text{oj}$, as an injection per vaginam: in this case there was ulceration of the os uteri. The disease succumbed to proper treatment, which it is not necessary to detail. Such results are not infrequent in vaginal injections of lead, especially when long continued: still the probabilities are, that in this case the disease was accelerated by the ulcerated condition of the parts.

Experiments were tried with many of the lower order of animals, as the dog and rabbit. The hair was shaven off from the thighs and belly, and strong solutions of lead, also the cerate of lead, were applied: this was frequently repeated for a long time. In no instance did any lead symp=

= toms appear. Tanguerel argues from this the impossibility of induction of lead by the healthy skin, in sufficient quantities to produce symptoms of lead poisoning: still, he holds, that like mercury and other metallic substances, it must in a small measure at least enter the system; but, unlike them, in too minute quantities to produce any effect.

In this disease as in most others, the predisposing causes range according to age, sex, temperament and general habits. The age, as is most natural, corresponds the age presenting the greatest usefulness and activity, viz. from the age of 25 to that of 45 years: between these ages are a large proportion of the ~~lead~~ manufacturers and dealers in lead, miners, painters, &c. Statistics show, of 1149 cases, 911 were as above, - between 25 and 45 years of age. Women are far less frequently attacked than men: - the most plausible rea=

Diagnosis of Lead Poisoning

- 1st Pain. twisting. tearing.
- 2nd Constipation. severe.
- 3rd Urine. scanty & acid
- 4th Stomach. irritable.
- 5th Breath foetid.
- 6th Blue line on gums.
- 7th Retraction & hardness of abdomen.
- 8th Tumors of abdomen.
- 9th Tongue - moist. &c.
- 10th Fever in disease: never except in febrile complications.
- 11th Paralysis - especially the Drop Wrist.

Hyde

-soning for this is, that they are workers of lead in far smaller ratio than men; still, in some neighborhoods, where women are engaged to-
-gether with men, in the grinding of white lead, statistics prove an equal liability on their part to contract this disease.

Temperament.— has little if anything to do in predisposing causes of this disease. Of 72 patients, just one half were robust and sanguine; the rest, nervous and lymphatic, and of middling constitution. Once in a great while a very peculiar constitutional susceptibility appears in a patient, to this disease, as where by remaining two or three hours in a newly painted room, caused lead symptoms; but these may well be called exceptions, so rare are they.

The season of the year, according to the best writers upon this subject, has no effect whatever, upon the contraction or cure of this disease.

Apparently strange inconsistencies ex-

-hibit themselves in different patients: some escaping under precisely the same circumstances as those under which others suffer.

Again, — one person may be attacked once only during a life time, while another may be attacked as often as exposed —

Action of Lead. Lead is supposed to act upon the system, by its immediate influence upon the nervous matter, wherever it comes in contact with it. Its action seems to be similarly definite on both motor and sensitive nerves, diminishing and ultimately destroying all motor power, as well as the power of receiving and conveying the impressions to and from the part.

It is now generally believed, that the local effects of this disease always precede its general and constitutional effects: that it gradually attacks the nervous centers, causing the lead paralysis: last

of all, overpowers the Brain. It not infrequently reaches the two first stages: from these, patients almost invariably recover: but from the third stage, — attack of the Brain, — there is far greater danger, and even a large proportion prove fatal. Its real approach signifies emphatically the excessive nervous depression of the whole system, and forebodes too often cerebral and spinal congestion, hemorrhage, and a host of other evil concomitants, such as complete paralysis of the body or mind or both.

Diagnosis. The diagnosis of lead poisoning is not difficult. Certain symptoms always accompany it which betoken no other disease: Still, many of its symptoms are synonymous with those of other diseases, as for instance, the acute pain of lead colic often resembles that of gastro-Enteritis, and other

inflammatory diseases of the abdominal viscera. But in this disease, as in all others, we must not judge by one symptom, but from the aggregate symptoms. We are to study the antecedents of the case, and with a careful review of its peculiar specific physiognomy, we can scarcely make a wrong diagnosis. We have the acute pain with its intervals — constipation — nausea — slow, hard pulse — great anxiety — peculiarly altered secretions — paralysis — grotesque motions, &c. These, with other concomitants of the disease, should declare the malady at once.

The predominant symptom of this disease is Lead Colic; and, really, so frequent is the occurrence of this in the disease, that all lead diseases, in general, are sometimes spoken of under the name, Lead Colic. A few of its characteristics are as follows: —

Pain: — this is often of the most intense

character. It is variable in its position, the umbilicus having the preference. The epigastrium and hypogastrium next, in order. The pain is generally on or near the mesial line; sometimes, though rare, it affects the renal regions, and again, the testicles.

The pain is described as of a severe twisting character, sometimes of a tearing, pricking, or burning sensation. It is frequently much relieved by pressure directly upon the parts; at other times simulating acute inflammation, the parts cannot be touched without great and increased pain.

During these spasms, the anxiety and anguish depicted on the patients countenance are indescribable:— he moans,— rolls from side to side of his bed,— doubles himself up,— strikes his abdomen,— bites his fingers,— and sometimes despair forces them to attempt or beg immediate death.

This however is only a picture of violent cases; by far the majority do not suffer so extremely.

In lead colic there are distinct intervals between the exacerbations: these may be only remissions or they may be complete intermissions. They vary from a few seconds or minutes in length, to hours and even days. It is also said that patients are sometimes instantly relieved from a severe spasm and no returns ever follow: but, they generally continue to return, growing less severe each time till they finally cease.

Constipation:— this is next in prominence among the characteristics of lead poisoning. It is said to vary in intensity with the pain. In violent colic, so obstinately constipated are the bowels sometimes, that the most powerful drastic purgatives are demanded to produce evacuations:— these are followed at first by small, hard

lumps of feces, then by dark mucous ex-
crements. The patient frequently feels an
irresistible impulse to go to stool, yet is
incapable.

Urine, generally natural, but scanty and
acid.

The Stomach, is frequently irritable, rejec-
ting food, for which, as a general thing there
is no appetite.

The Breath, almost invariably has a
foetid smell, sometimes almost intolerable.

Around the base of the teeth and upon
the gums, there is often a blue streak.

This is an infalible sign of lead disease.
Chemists distinguish it as Sulphuret of Lead.

This is deposited gradually, and formed
by the action of lead with the sulphuretted
hydrogen, evolved from the decomposed par-
ticles of food, lying between the teeth and
gums.

Retraction and hardness of the abdomen
is another, sometimes ^{valuable} diagnostic sign.

Tanquerel says of 1217 patients, 649 had this symptom. Speaking of its intensity, he says, "It may be manifested in infinite degrees: - sometimes so depressed as to appear glued to the spine, which then can be easily felt and distinguished by the touch."

From various authors we learn that the retraction is similarly situated with the pain, choosing in order, the umbilicus, [frequently sunken cup-shape], epigastrium and hypogastrium. This is an actual spasm of the abdominal muscles, as it cannot be overcome by bending the lower limbs upon the pelvis, or diverting the patients attention from it. The length of its duration is generally synonymous with the exacerbations of pain.

The abdomen scarce ever shows inflation and never much.

Tumors: - both stationary and mobile appear in the abdominal parietes, caused

by spasmodic action of the intestines or accumulation of feculent matter: they disappear with the exacerbation, or continually with the disease.

There is frequent nausea, - but little vomiting, not at all in proportion to the pain.

Usually, there is great difficulty in evacuating the Stomach. There is no general rule of treatment for this: medicines favorable to one may be most unpleasant and oppressive to another. The matter vomited is generally greenish in color, viscid, very foetid, bitter, and coppery in taste: this in extreme cases is colored with blood or merely striated.

Tongue: - this is moist: generally covered with a whitish or light yellow coat in the middle and brown on the posterior portion of it. It is sometimes enlarged for the time being -

Fever is never a concomitant of lead disease, except in febrile complications.

Paralysis, Encephalopathy and Arthralgy appear at times in lead disease. The Encephalopathy and Arthralgy I shall not speak of, as they so seldom appear before the practitioner; - and my space is limited.

Of Paralysis, as aforesaid, it may be, externally, partial or complete. But the more common form in which it appears is in one or two of the extremities, as the arm or leg. By far the most common is what is called "drop wrist," or paralysis of the extensor muscles of the fore arm. The probable reason why we do not see the other forms, is, that medicinal means, are used here, to ward off increase of the disease; so that it does not have time to attack other parts before arrested. But why the paralysis should attack the forearm first, in preference to other parts of the body is not accounted for.

Prognosis. This may always at the beginning of cases, be given as favorable, and, indeed, so seldom does this disease arrive to an advanced stage before intercepted, that the physician never gives, and scarce ever thinks of an adverse prognosis. When left merely to nature's efforts, it often cures itself, though it is only in a certain class of cases that this will occur: proper or improper treatment has much to do with the prognosis.

For a disease, which is generally so severely painful and acute in its symptoms, it terminates in recovery in a remarkably short space of time, - a few days frequently sufficing. This is however, only in primary cases: where Paralysis, Encephalopathy, &c. supervene, then, if a cure is effected, it is expected to be long and tedious.

It is estimated by Tarquereel that about $\frac{1}{4}$ of the cases of lead disease

result in Encephalopathy: these never present a favorable diagnosis. - too often proving fatal. Excepting this complication, the no. of deaths from all the others is about 1 in 43. So we see death is comparatively a rare occurrence.

There may be influences which tend to retard the cure of colic or which render it chronic; these are necessarily accompanied with an unfavorable prognosis.

Again, whenever Metastasis takes place from one organ to another as from any of the abdominal viscera to the brain, or large joints, it always betokens bad results, and is an index by which to judge to what an extent the disease has already obtained the mastery over the system.

While the disease remains in the abdomen, it is generally considered curable, the prognosis always being more

or less favorable in accordance with the severity of the symptoms: any departure from this primary seat of the disease, is looked upon suspiciously by the practitioner.

Relapses also favor a grave prognosis.

Treatment. Crevallier & Rayer knowing the laws of chemical decomposition, proposed the use of hydrosulphuric acid, which they supposed would take up the particles of lead in the system, & without further injury to the system, carry them off, effecting a cure: but he failed in the application of his pet theory. *Nerx bonica* was tried by Tanguerel: - respecting it he says, "It seemed inhuman to experiment with other medicines, which experience had proved to be powerless in this affection". He treated 14 patients with it, they growing worse & worse each day, till he finally adopted other treatment.

Broussais considering this GastroEnteritis treated it with bleeding, repeated leeching.

warm fomentations, baths. Emollient injections. and diluent drinks. Great success was claimed for this treatment though public opinion has been slow to decide in favor of it. Emetics Cathartics have been given & in many instances produced great relief.

Opium, here, as in every other disease has been used, and as every where else has strong friends and Equally strong enemies. Dr. Stoll used this solely and Extensively. and says. "his cures were very happy, prompt, lasting and numerous." Others have failed entirely in producing so favorable results. Still, it is used to a great extent at the present day, in combination, by practitioners.

The purely Purgative Method has been advocated by hosts of physicians: the base of this treatment is Croton oil: this class of physicians boast very numerous and complete cures as results of their practice. It is said that much superior effects result from the use of the two latter

medicines used conjointly. Mercury, again, is often used. Wood says, "Mercury appears to exercise a specific controlling effect on lead poisoning, but as its operation when pushed too far is very inconvenient, & as in so severe a disease, it cannot always be used with that caution which would only secure a slight impression on the mouth, it is best to use it only in urgent cases. The Iodide of Potassium. This article at the present time, appears to supercede all others of the Pharmacopoeia, in the treatment of lead poisoning: still some, even yet, will not recognize its superiority over their pet treatments. It is known positively that it decomposes the particles of lead, carrying them off by the action of the kidneys. It is the nearest a specific for this disease, of any treatment now practiced.



YALE MEDICAL LIBRARY



3 9002 08670 4781

Accession no. 23007

Author

Yale Univ.
Theres, in Doctor
of Medicine

Call no.

Archives

T113

Y11

1861

